SPAWAR
Systems Center
PACIFIC

MD-1324 and MD-1324A 5kHz Modem Overview, Issues and Status

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Support Contactor providing TSN support on
DMR, MD-1324
1 Mar 2011

"Sustaining the Tactical Edge through reliable C4ISR UHF SATCOM Support"

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MD-1324 (C)/U Variants

- Two fielded MD-1324 modem variants - one with (the MD-1324A C/U) and one without a dedicated single RF Channel receiver front end. Both modems use an external HPA/UpConverter to transmit.
- MD-1324 “straight” is without the RF Front End, and it must rely on 70MHz RCV IF from a WSC-3 to not only Transmit but to also Receive from the satellite.
- A third MD-1324A + IW modem version soon to be fielded which will support 183B IW waveforms

Fielding: where is it installed ?

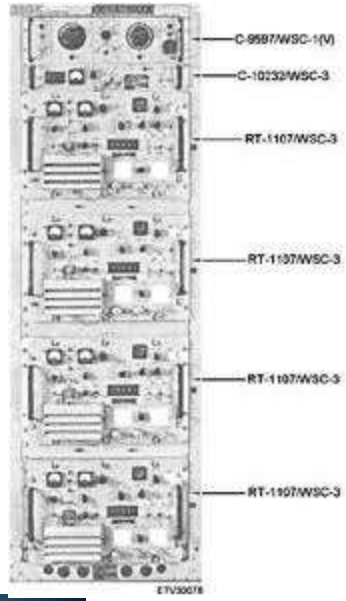
- Installed in 100+ shore sites and almost all USN, USNS, SSN, SSGN ships/ subs
- 600+ modems fielded
- Critical to Tomahawk Blk IV TSN
  - Missile comms in flight
  - CG, DDG, CV/CVN shooters
- Also Supports dedicated 5kHz Voice comms for most Amphibs
  - LHA, LHD, LPD, LSD
  - ESG, MEU, LFOC comms
- FMS: UK, AU, other Coalition forces

MD-1324 Overview

- Uses shipboard UHF SATCOM Antenna and an External HPA / Up Converter (like a UHF SATCOM AN/WSC-3, ARC-210, or DMR RFS).
- Supports 5kHz and 25kHz DAMA and Non-DAMA UHF SATCOM voice and data capability across a broad UHF satellite footprint covering almost ½ the globe per RF Channel up/downlink frequency pair.
- Low cost light weight comms to manpac radio users and low data rate reliable comms to disadvantaged users.
- Simultaneously supports two Digital I/O ports in 25kHz DAMA mode for CUDIXS, SAT TADIL-J, and ANDVT Voice or combo of both. Supports SAT TADIL-A Link-11, and DAMA BCST Reception.

What's it used for

- GENSER Message Systems:
  - CUDIXS/ NAVMACS. NOW TTY, BCST
- Air Tracks
  - SAT-TADIL-J, SAT TADIL-A
- Secure Voice-
  - ANDVT Covered SATHICOM, CSG/ESG CMD
- TSN
  - TACTICAL Tomahawk COMMS in flight



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What's the Problem?

- Tactical UHF LOS stepping on UHF SATCOM Downlinks
  - UHF SATCOM is in the 243.8 to 270+ MHz range
  - SATCOM: -50dBm to -120dBm downlink signals are typical
  - NO filtering possible in-band within the SATCOM Antenna System
  - Limited deconflict effort seen in some AORs
- UHF LOS Interference
  - Co-site coupling and preamp applies up to +30dBm at Radios
  - SATCOM Receivers see it as noise swamping SATCOM signals and jacking up their AGC (reducing their sensitivity)
  - Local EMI, but caused by Shore Training Freq assignments, and shore sites nearby
- SEMCIP Involvement
  - Problem verified during EMC Certifications
  - Reports 40% of MD-1324As degraded or INOP.

What's the Solution?

- Mitigate Modem Hardware Degradation & RF Burnout
  - 22 of 62 with Bad Receivers in the modems turned in last year
  - Improved Screening and Q/A
  - IW modem: new EC-2 Receiver Front End tolerates +30dBm
- Better Spectrum Management
  - CONUS OPTASK COMMS have been cleared of offending freqs
  - Limit Primary assignments in lower half of band (243 to 260)
  - Secondary assignments only in upper half

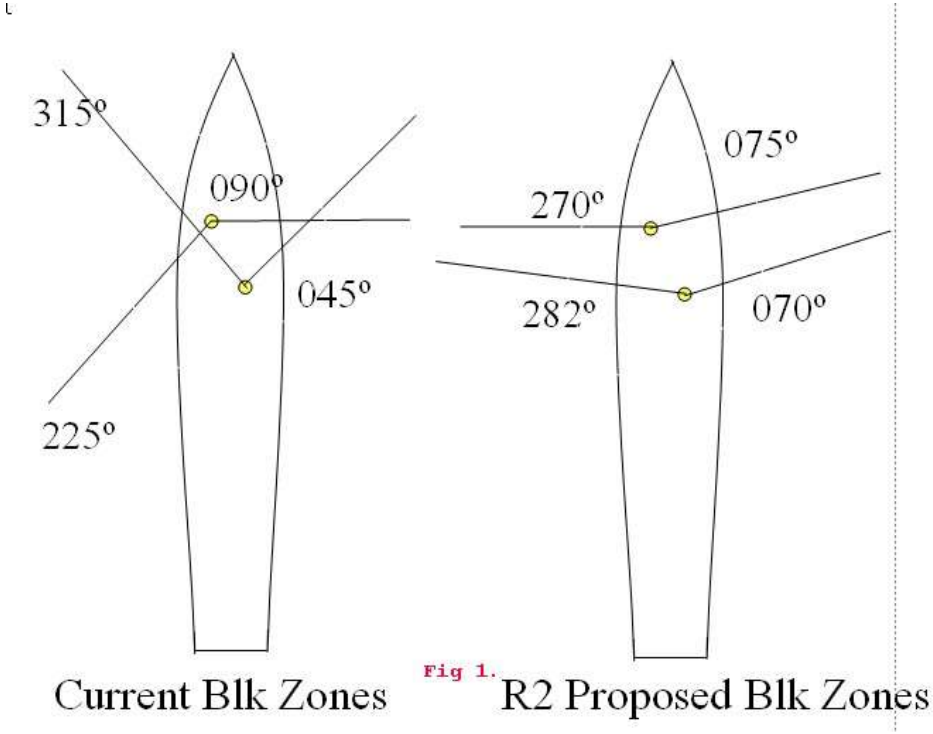
to 277MHz and only as-required low duty cycle ckts.

Table 7-11. AFSATCOM wideband channel frequency assignments (MHz).

PLAN A & X		PLAN B & Y		PLAN C & Z		PLAN W	
UPLINK	DOWNLINK	UPLINK	DOWNLINK	UPLINK	DOWNLINK	UPLINK	DOWNLINK
285.950	248.350	285.950	251.450	285.950	252.850	287.150	253.350
290.075	250.375	290.075	251.475	290.075	252.875	287.175	253.375
294.000	250.400	290.100	251.500	290.100	252.900	287.200	253.400
294.025	250.425	290.125	251.525	290.125	252.925	287.225	253.425
294.050	250.450	290.150	251.550	290.150	252.950	287.250	253.450
294.075	250.475	290.175	251.575	290.175	252.975	287.275	253.475
294.100	250.500	290.200	251.600	290.200	253.000	287.300	253.500
294.125	250.525	290.225	251.625	290.225	253.025	287.325	253.525
294.150	250.550	290.250	251.650	290.250	253.050	287.350	253.550
294.175	250.575	290.275	251.675	290.275	253.075	287.375	253.575
294.200	250.600	290.300	251.700	290.300	253.100	287.400	253.600
294.225	250.625	290.325	251.725	290.325	253.125	287.425	253.625
294.250	250.650	290.350	251.750	290.350	253.150	287.450	253.650
294.275	250.675	290.375	251.775	290.375	253.175	287.475	253.675
294.300	250.700	290.400	251.800	290.400	253.200	287.500	253.700
294.325	250.725	290.425	251.825	290.425	253.225	287.525	253.725
294.350	250.750	290.450	251.850	290.450	253.250	287.550	253.750
294.375	250.775	290.475	251.875	290.475	253.275	287.575	253.775
294.400	250.800	290.500	251.900	290.500	253.300	287.600	253.800
294.425	250.825	290.525	251.925	290.525	253.325	287.625	253.825
294.450	250.850	290.550	251.950	290.550	253.350	287.650	253.850

What's the Solution (contd.)?

- Ref SECRET Message sent in 2007 and re-sent as:
  - NAVSURFWARCENDIV DAHLGREN/Q54 171913Z DEC 09
- Shipboard Antenna RF Block Zone Optimization



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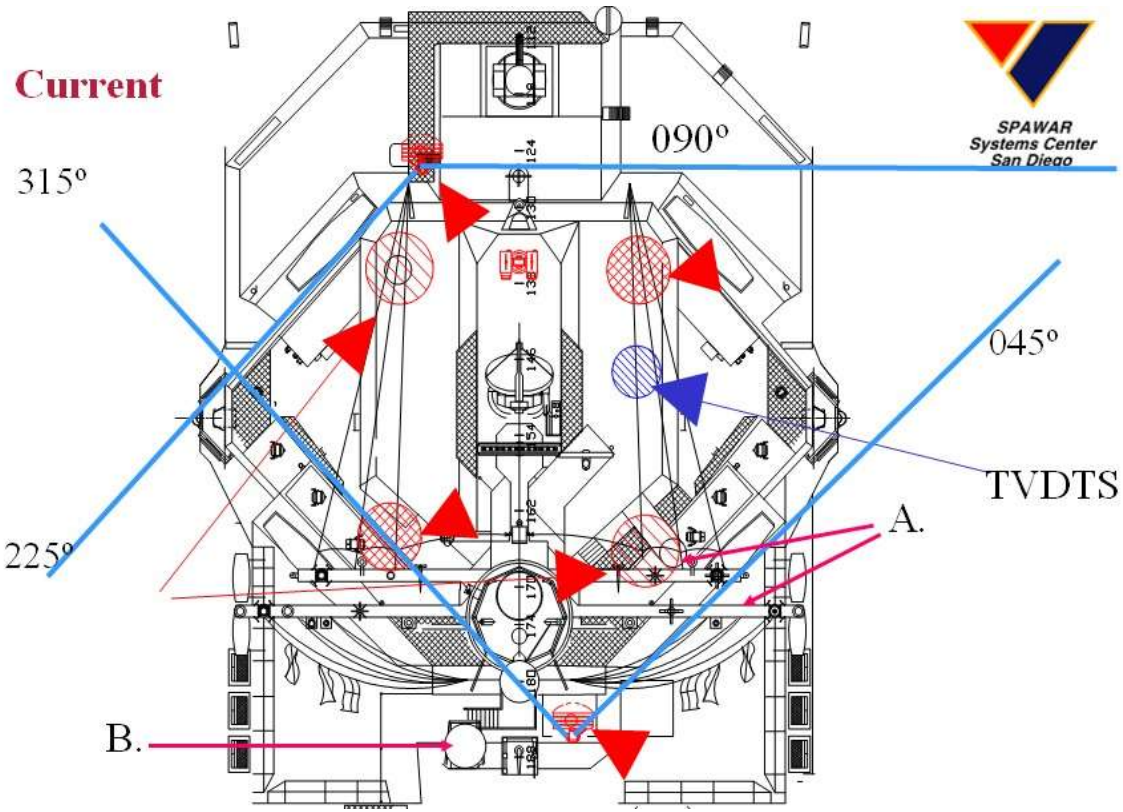
Backup Slides

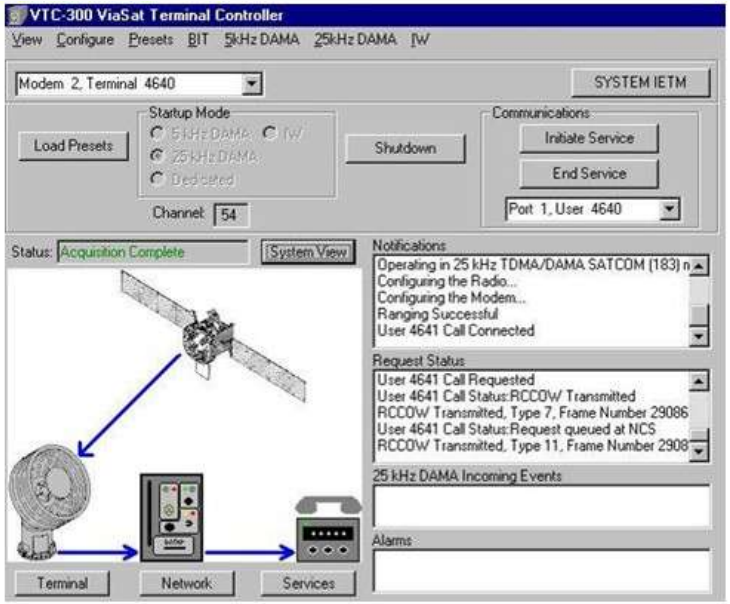
- Pop Up notices added to DMR HMI s/w
  - Warn User of potential neg-impact on SATCOM as he sets a UHF LOS freq in the SATCOM band

What's the Solution (contd.)?

- Shipboard Antenna RF Block Zone Optimization



Who Wins?


VTC-300 ViaSat Terminal Controller
View Configure Presets BIT 5kHz DAMA 25kHz DAMA IW
Modem 2, Terminal 4640
SYSTEM IETM
Startup Mode
5 kHz DAMA IW
25 kHz DAMA
Dedicated
Load Presets
Shutdown
Communications
Initiate Service
End Service
Port 1, User 4640
Channel 54
Status: Acquisition Complete
System View
Notifications
Operating in 25 kHz TDMA/DAMA SATCOM (183) n
Configuring the Radio...
Configuring the Modem...
Ranging Successful
User 4641 Call Connected
Request Status
User 4641 Call Requested
User 4641 Call Status:RCCOW Transmitted
RCCOW Transmitted, Type 7, Frame Number 29086
User 4641 Call Status:Request queued at NCS
RCCOW Transmitted, Type 11, Frame Number 2908
25 kHz DAMA Incoming Events
Alarms
Terminal
Network
Services


DMR
Maintainer
Planned Maintenance
R/T Planned Maintenance
Front Panel Removal
After replacement of the INFOSEC Hold Up Battery or the Filter, reinstall the R/T's lower front panel